

# Changes in Physician-Population Ratios Among the States

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RECENTLY I had occasion to use the statistics published by the Public Health Service in its Health Manpower Source Book series. In the course of examining these data I gained the impression that over the past 20 years or so changes among the several States in relative supply of physicians followed some fairly definite geographic patterns. The findings on more intensive investigation are the subject of this note.

The data to be covered in this analysis are taken from the 1st and 10th sections of the Health Manpower Source Book (1,2). The Public Health Service obtained the initial information about each physician in the country from pertinent editions of the American Medical Directory and, for 1959, from punchcards supplied by the American Medical Association.

This presentation is based on all physicians in the United States classified in the Health Manpower Source Book as "active non-Federal," exclusive of those in Alaska, Hawaii, and the District of Columbia. "Active" refers to physicians engaged in some kind of medical practice, including hospital service, teaching, and administration. Physicians classified as Federal employees include medical officers on active duty with the Army, Navy, Air Force, Public Health Service, and Veterans Administration; these physicians are excluded from the study.

The trends to be examined are those between 1940 and 1959. Since some interesting shifts occurred in the fifties as compared with those

in the forties, the data for these two decades will be examined separately. Statistics for 1940 are used instead of those for 1939 because the information in the closest American Medical Directory applies to that year.

## Patterns of Change

The general nature of the gains and losses of physicians is shown in the map. The States are divided into four groups: (a) States with a relative gain in physicians in both decades; (b) States with a gain in physicians in the second decade but a loss in the first; (c) States which lost physicians in the second decade but gained them in the first; (d) States which lost physicians in both decades. The groupings, together with the percentage of gain or loss within each decade, are shown in tables 1-4.

Among the patterns to be discerned in the array of the States as listed in tables 1-4 are these:

- The group of 12 States with gains in both decades (table 1) contains a very noticeable cluster of 6 southern States—Alabama, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina. This group also contains three contiguous New England States—Connecticut, Massachusetts, and Vermont.

- In the group of nine States which gained physicians between 1940 and 1949 and then lost physicians between 1950 and 1959 are three Mountain States—Arizona, Colorado, and Montana (table 2). South Dakota and Minnesota, two neighboring States, are also in this group.

- Perhaps the most significant finding is the large loss in relative supply of physicians that

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has taken place in the north central States (table 3). The 19 States which lost in physician-population ratio in both decades make up the largest of the four groups, and 9 of these—Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, Ohio, and Wisconsin—are in the north central region. Kentucky, West Virginia, and Pennsylvania, whose mining areas have been hard hit by unemployment and economic recession, are also in this group.

• States with a loss in relative number of physicians between 1940 and 1949 and a gain between 1950 and 1959 include all three States on the west coast—California, Oregon, and Washington (table 4). Arkansas, Florida, Tennessee, and Virginia, after losing physicians in 1940–49, joined the other southern States in gaining physicians in 1950–59. North Dakota is also included in this group.

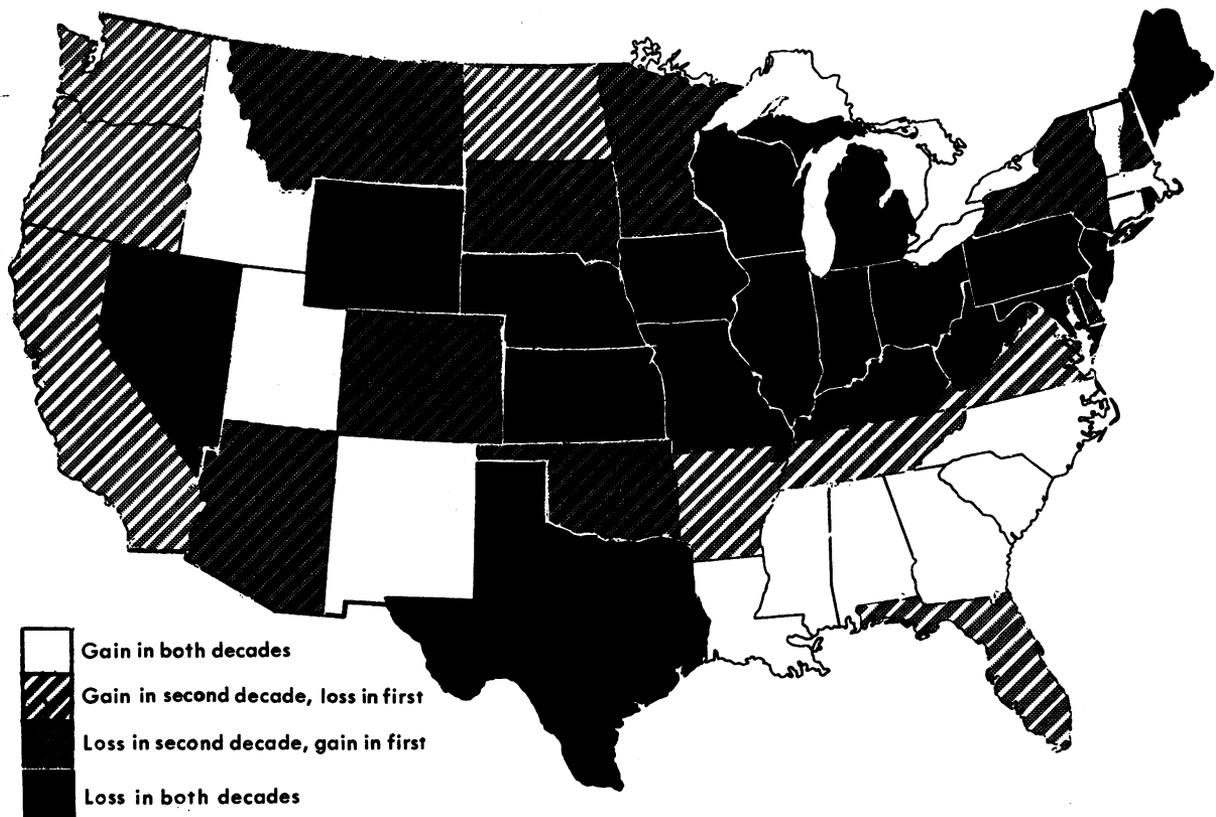
As might be expected, the magnitude of the changes varied considerably. However, when States in the same region showed an increase or a decrease in relative supply of physicians, the

percentages of change tended to be of fairly similar magnitude. Thus, Alabama, Georgia, Mississippi, and South Carolina made gains of 3.0, 1.2, 1.6, and 3.0 percent, respectively, between 1940 and 1949 and gains of 8.8, 7.1, 12.5, and 5.8 percent between 1950 and 1959. The gain was over twice as great in the second decade as in the first.

A number of States had gains or losses of less than 5.0 percent in both decades; that is, they just about held their own. This list consists of Massachusetts and Vermont, with small gains in each decade; New York and Oklahoma, with a small gain in the first decade and a loss in the second; Kansas, Pennsylvania, Rhode Island, Texas, and Wyoming, with small losses in both decades; and North Dakota, with a small loss and then a small gain.

The reader may wish to know whether the direction and size of change in physician-population ratio bore some relationship to the size of the relative supply of physicians. Was it the comparatively well-supplied States which

**Changes in physician-population ratios, United States, 1940–59**



gained additional physicians or was it the States which were behind the others? The data are shown in the last two columns of tables 1-4. Comparison of the two groups of States which either gained or lost physicians in both decades indicates that the gains have been registered by the "have nots," that is, the States which have made the most substantial gains are low in ratio of physicians to population compared with those States which are losing in relative supply of physicians. In large measure, this simply says that the States in the south are increasing their supply of physicians while the north central

**Table 1. States which gained in physician-population ratio in the decades 1940-49 and 1950-59**

State	Physicians per 100,000 civilians			Percent gain	
	1940	1949	1959	1940-49	1950-59
Alabama	66	68	74	3.0	8.8
Connecticut	139	152	162	9.4	6.6
Georgia	83	84	90	1.2	7.1
Idaho	72	77	83	6.9	7.8
Louisiana	97	104	108	7.2	3.8
Massachusetts	168	170	174	1.2	2.4
Mississippi	63	64	72	1.6	12.5
New Mexico	66	73	75	10.6	2.7
North Carolina	72	80	90	11.1	12.5
South Carolina	67	69	73	3.0	5.8
Utah	96	116	119	20.8	2.6
Vermont	134	140	141	4.5	.7

**Table 2. States which gained in physician-population ratio in 1940-49 but lost in 1950-59**

State	Physicians per 100,000 civilians			Percent gain 1940-49	Percent loss 1950-59
	1940	1949	1959		
Arizona	92	97	88	5.4	9.3
Colorado	152	158	145	3.9	8.2
Delaware	119	126	112	5.9	11.1
Minnesota	118	132	126	11.9	4.5
Montana	86	94	88	9.3	6.4
New Hampshire	120	126	123	5.0	2.4
New York	191	196	187	2.6	4.6
Oklahoma <sup>1</sup>	93	94	94	1.1	.8
South Dakota	71	73	68	2.8	6.9

<sup>1</sup> Ratios recomputed to one decimal place to determine whether there was loss or gain.

**Table 3. States which lost in physician-population ratio in the decades 1940-49 and 1950-59**

State	Physicians per 100,000 civilians			Percent loss	
	1940	1949	1959	1940-49	1950-59
Illinois	145	140	119	3.4	15.0
Indiana	113	103	93	8.9	9.7
Iowa	115	105	93	8.7	11.4
Kansas	105	103	102	1.9	1.0
Kentucky	90	84	82	6.7	2.4
Maine <sup>1</sup>	105	96	96	8.6	.9
Maryland	145	136	128	6.2	5.9
Michigan	114	106	104	7.0	1.9
Missouri	130	120	110	7.7	8.3
Nebraska	116	114	102	1.7	10.5
Nevada	123	110	97	10.6	11.8
New Jersey	132	128	117	3.0	8.6
Ohio	127	116	112	8.7	3.4
Pennsylvania	129	128	127	.8	.8
Rhode Island <sup>1</sup>	124	118	118	4.8	.2
Texas <sup>1</sup>	99	95	95	4.0	.3
West Virginia	91	84	80	7.7	4.8
Wisconsin	105	104	98	1.0	5.8
Wyoming	85	83	81	2.4	2.4

<sup>1</sup> Ratios recomputed to one decimal place to determine whether there was loss or gain.

States and some of the northeastern States are confronted by decreases.

How the four geographic regions of this country have fared over the last 20 years with respect to supply of physicians can be seen in table 5. The south, it would appear, is catching up with the north central States, and the west with the northeastern States.

### Changes in Number

The ratio of physicians to population is essentially a fraction consisting of a numerator, the number of physicians, and a denominator, the population. An increase in a rate, such as the ratio of physicians to population, can result from an increase in the numerator or from a decrease in the denominator, or both, or from a more rapid increase in the numerator than in the denominator. A decrease in a rate can occur in an analogous fashion. Since the population of the United States has increased by almost 50 million people since 1940 and the number of active non-Federal physicians by

almost 50,000, it is hardly likely that many States would have lost an absolute number of residents or physicians. The change in ratio of physicians to population therefore depends in most instances on where the greater gain lay, in physicians or in population.

In the southern States the gain in physicians since 1940 has far exceeded the gain in population. Among the reasons, no doubt, is the industrial rise which has taken place in the south in recent years. North Carolina, which is generally credited with having made the greatest strides in this direction, showed the greatest gain in number of physicians. Connecticut, Massachusetts, and Vermont also made greater gains in number of physicians than in population, but the relative gains in Massachusetts and Vermont were small. In Connecticut, where the gain was more substantial, the increasing suburban character of the State may be one of

**Table 4. States which lost in physician-population ratio in the decade 1940-49 but gained in 1950-59**

State	Physicians per 100,000 civilians			Percent loss 1940-49	Percent gain 1950-59
	1940	1949	1959		
Arkansas.....	84	82	88	2.4	7.3
California.....	143	142	152	.7	7.0
Florida.....	94	91	100	3.2	9.9
North Dakota <sup>1</sup> .....	76	75	75	1.3	.1
Oregon.....	119	109	120	8.4	10.1
Tennessee.....	92	90	99	2.2	10.0
Virginia.....	93	91	96	2.2	5.5
Washington.....	109	106	117	2.8	10.4

<sup>1</sup> Ratios recomputed to one decimal place to determine whether there was loss or gain.

**Table 5. Number of physicians per 100,000 civilian population, by geographic region, United States, 1940, 1949, and 1959**

Geographic region	Year		
	1940	1949	1959
Northeast.....	157	159	154
North central.....	122	116	107
South.....	91	92	96
West.....	125	126	134

**Table 6. Percentage increase in number of physicians and in population, west coast States, 1940-49 and 1950-59**

State	1940-49		1950-59	
	Physicians	Population	Physicians	Population
California.....	47.6	49.1	48.9	38.4
Oregon.....	24.2	35.5	30.3	18.1
Washington.....	30.9	34.1	31.6	19.5

the major reasons for its attractiveness to new physicians; the number of physicians per 100,000 population was 139 in 1940 and 162 in 1959.

Arizona more than doubled its number of physicians in the last two decades, yet it lost in relative supply. To a lesser extent, similar phenomena, that is, large gains in number of physicians, occurred in Colorado and Montana. The inference would seem to be that so rapid has the rise in population been that the supply of physicians has simply not been able to keep up with the inflow of new residents.

The three west coast States, constituting a rapidly growing area, lost in relative number of physicians in 1940-49 and gained in 1950-59. It may be worth looking at each decade separately for the comparison between increases in actual numbers of physicians and in population (table 6).

Population increased more rapidly than physicians in the forties and less rapidly in the fifties. This raises an interesting question: Which arrives first in an area, the doctor or the patient? As these data indicate, World War II and subsequent developments brought about tremendous migration to the west coast. While the rate of population growth slowed down in the second decade of our study compared with growth in the first decade, growth in number of physicians increased. The demand for services is created first, and then the services follow. The situation in Florida, not unexpectedly, was similar to that in California, with a loss in ratio of physicians to population in the first of the two decades and a gain in the second.

In six of the nine north central States, all of which experienced a relative loss of physicians,

gain in actual number of physicians lagged behind growth in population. Three States which actually lost in net number of physicians—Iowa, Missouri, and Nebraska—are neighbors, located in the geographic center of the country. While the north central region still has a higher ratio of physicians to population than the south, it has fallen below the west in this respect in the last 20 years and may ultimately fall below the south. The need for increasing the output of physicians who will remain in the area in which

they graduate may be greater in the north central region than anywhere else in the country.

#### REFERENCES

- (1) Pennell, M. Y., and Altenderfer, M. E.: Health manpower source book. 1. Physicians. PHS Publication No. 263, sec. 1. U.S. Government Printing Office, Washington, D.C., 1952.
- (2) Stewart, W. H., and Pennell, M. Y.: Health manpower source book. 10. Physicians' age, type of practice, and location. PHS Publication No. 263, sec. 10. U.S. Government Printing Office, Washington, D.C., 1960.

## PHS Personnel Announcements

**Mark D. Hollis**, Assistant Surgeon General and chief engineer of the Public Health Service since 1948, retired from the Service to become chief engineer of the World Health Organization on November 15, 1961. Mr. Hollis was a Commissioned Corps officer for 30 years, 25 of them on active duty.

During World War II, he served as executive officer and later director of the Service's malaria, typhus, and dengue fever control operations. He was chief of the Communicable Disease Center in Atlanta, Ga., during 1945-46.

Since 1950, Mr. Hollis has devoted his major attention to environmental health problems, particularly the effects of population growth and technological change on environmental health. He is chairman of the board of consultants of the National Sanitation Foundation and a U.S. commissioner on the Potomac River Interstate Water Commission.

Mr. Hollis has been awarded the Distinguished Service Medal of the Public Health Service Commissioned Corps.

**Dr. John W. Knutson**, chief dental officer of the Public Health Service since 1952, retired from active duty on October 1, 1961. He has been appointed by the University of California at Los Angeles as professor of preventive dentistry in the School of Dentistry and professor of public health in the School of Public Health.

Dr. Knutson served in the Public Health Service for 30 years. One of his major contributions was his

work in the development of an epidemiologic index that made possible more accurate measurements of extent of dental caries in population groups. Another major achievement was his study during the 1940's of topical application of fluorides for the prevention of caries.

In 1955, he served as the first dental health officer of the World Health Organization and participated in the planning of WHO's worldwide dental health program. He was president of the American Public Health Association in 1956.

In recognition of his many contributions, Dr. Knutson was awarded the Distinguished Service Medal of the Public Health Service Commissioned Corps in 1961.

Dr. Knutson has been a member of the board of editors of *Public Health Reports*.

**Dr. Wilson T. Sowder** assumed his duties as chief of the new Office on Aging of the Public Health Service on October 16, 1961. He has been State health officer for Florida since 1945 and has won national recognition for his programs for the aged in that State.

Dr. Sowder has been in the Commissioned Corps of the Public Health Service since 1934. He has been president of the State and Territorial Health Officers Association and of the American Association of Public Health Physicians, a member of the executive board of the American Public Health Association, and chairman of the preventive medicine section, American Medical Association. He has also served on the board of editors of *Public Health Reports*.